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WHAT IS CLAIMED IS:

- 1 . An optical limiter device comprising:
 - an optically transmissive substrate; and
 - a layer on a first surface of the substrate, the layer including a trimetallic nitride endohedral metallofullerene.
- 2 . The optical limiter device of claim 1, wherein the layer includes one or more of:
 - a thin film including the trimetallic nitride endohedral metallofullerene, a layer material with a cavity containing a solution including the trimetallic nitride endohedral metallofullerene, a sol-gel containing a trimetallic nitride endohedral metallofullerene, and a self assembled monolayer containing a trimetallic nitride endohedral metallofullerene.
- 3 . The optical limiter device of claim 2, wherein the layer a thin film consisting essentially of the trimetallic nitride endohedral metallofullerene.
- 4 . The optical limiter device of claim 1, wherein the trimetallic nitride endohedral metallofullerene has a general formula $A_{3-n}X_nN@C_m$, wherein n ranges from 0 to 3, A and X are a trivalent metal, m is between about 60 and about 200, and N is a heteroatom/ion.
- 5 . The optical limiter device of claim 1, wherein N is nitrogen.
- 6 . The optical limiter device of claim 4, wherein the trivalent metal is a rare earth metal or a group IIIB metal.
- 7 . The optical limiter device of claim 6, wherein A is selected from the group consisting of Scandium, Yttrium, Lanthanum, Gadolinium, Holmium, Terbium, Erbium, Thulium, and Ytterbium.
- 8 . The optical limiter device of claim 7, wherein A is selected from the group consisting of Terbium, Erbium, Holmium, Scandium and Yttrium.

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9. The optical limiter device of claim 6, wherein X is selected from the group consisting of Scandium, Yttrium, Lanthanum, Gadolinium, Holmium, Terbium, Erbium, Thulium, and Ytterbium.

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10. The optical limiter device of claim 1, wherein the substrate is a glass.

11. The optical limiter device of claim 10, wherein the substrate is quartz or a chalcogenide glass.

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12. The optical limiter device of claim 1, wherein the layer has a thickness of one monolayer of the trimetallic nitride endohedral metallofullerene to 1 mm.

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13. The optical limiter device of claim 12, wherein the thickness is from about 1 nm to 1 micron.

14. The optical limiter device of claim 1, wherein the layer is a patterned layered.

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15. A method of forming an optical limiter device, the method comprising; forming a layer including a trimetallic nitride endohedral metallofullerene on a substrate by a technique selected from the group consisting of a vapor deposition technique, a solution technique and a self-assembled monolayer technique.

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16. The method of claim 15, wherein the vapor deposition technique includes physical vapor deposition, chemical vapor deposition, laser assisted deposition, molecular beam evaporation.

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17. The method of claim 15, wherein the solution technique includes evaporation from solution, electrochemical deposition, electrophoretic deposition.

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18. The method of claim 15, wherein the solution technique includes encapsulating a solution containing the trimetallic nitride endohedral metallofullerene in a cavity in the layer.
- 5 19. The method of claim 15, wherein the self-assembled monolayer technique includes forming a layer of a functionalized molecule on the substrate, the functionalized molecule modified for improved solubility in an aqueous or non-aqueous solvent.
- 10 20. The method of claim 19, wherein functionalized molecule preferentially binds to the trimetallic nitride endohedral metallofullerene and/or to a first surface of the substrate.
21. The method of claim 15, wherein the trimetallic nitride endohedral metallofullerene has a general formula $A_{3-n}X_nN@C_m$, wherein n ranges from 0 to 3, A and X are a trivalent metal, m is between about 60 and about 200, m is between about 60 and about 200, and N is a heteroatom/ion.
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20 22. The method of claim 21, wherein N is nitrogen.
23. The method of claim 21, wherein the trivalent metal is a rare earth metal or a group IIIB metal.
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20 24. The method of claim 23, wherein A is selected from the group consisting of Scandium, Yttrium, Lanthanum, Gadolinium, Holmium, Terbium, Erbium, Thulium, and Ytterbium.
25. The method of claim 24, wherein A is selected from the group consisting of Terbium, Erbium, Holmium, Scandium and Yttrium.
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26. The method of claim 23, wherein X is selected from the group consisting of Scandium, Yttrium, Lanthanum, Gadolinium, Holmium, Terbium, Erbium, Thulium, and Ytterbium.

5 27. The method of claim 15, wherein the substrate is a glass.

28. The method of claim 27, wherein the substrate is quartz or a chalcogenide glass.

10 29. The method of claim 15, wherein the layer is deposited to a thickness of one monolayer of the trimetallic nitride endohedral metallofullerene to 1 mm.

30. The method of claim 27, wherein the thickness is from about 1 nm to 1 micron.

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31. The method of claim 15, comprising patterning the layer.

32. The method of claim 31, wherein patterning includes masking or photolithography.